Exhibit G

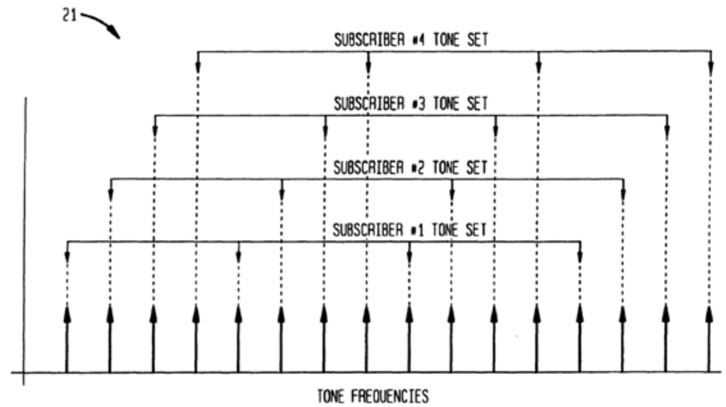
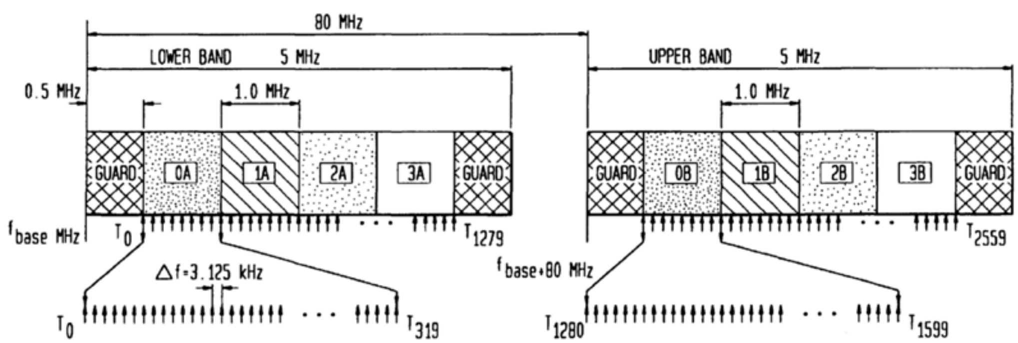
INVALIDITY CONTENTIONS FOR U.S. PATENT NO. 7,177,369 BASED ON USP 6,359,923 ("AGEE 923")

Based upon Plaintiff's Complaint, Infringement Contentions, and apparent claim constructions and application of the claims to Defendant's accused products, as best as they can be deciphered, the reference charted below anticipates or at least renders obvious the asserted claims. These invalidity contentions are not an admission by the Defendant that the accused products are covered by or infringe the asserted claims, particularly when these claims are properly construed and applied. These invalidity contentions are not an admission that the Defendant concedes or acquiesces to any claim construction implied or suggested by Plaintiff's Complaint or Infringement Contentions. Nor is Defendant asserting any claim construction positions through these charts, including whether the preamble is a limitation. The portions of the prior art reference cited below are not exhaustive but are exemplary in nature.

U.S. Patent No. 6,359,923 to Agee et al. ("Agee 923") was filed on December 18, 1997 and issued on March 19, 2002, This patent is prior art under at least 35 U.S.C. § 102(a)(b)(e)(g), and 103(a). As described in the following claim chart, the asserted claims of U.S. Patent No. 7,177,369 (the "'369 Patent"), are invalid as anticipated by Agee 923.

To the extent that Agee 923 is found not to anticipate one or more of the asserted claims of the '369 Patent, these claims are invalid as obvious in view of Agee 923 alone or in combination with other prior art references disclosed in Defendant's Invalidity Contentions and accompanying charts, including without limitation as set forth below.

'369 Patent	Agee 923
Claim 1	
1[p] A method comprising:	To the extent the preamble is limiting, Agee 923 discloses this claim limitation explicitly, inherently, or as a matter of common sense, or it would have been obvious to add missing aspects of the limitation. For example, see the following passages and/or figures, as well as all related disclosures: Agee 923 discloses a system in which a base station uses the reverse data signal to estimate the channel. Based on that estimate, Agee 923 adjusts the power levels of OFDM subcarriers transmitted to other devices such as subscriber devices on the downlink / forward channel.

’369 Patent	Agee 923
	Agee 923 describes an OFDMA system with different tones assigned to different subscribers, for example: FIG. 2  Agee 923 also describes assigning tones within “bands”, “subbands”, “partitions” and/or “traffic channels” to subscribers or users among the overall ensemble of traffic tones: FIG. 19  In reference to the example in FIG. 19, Agee 923 discloses that “there are a total of 2560 frequency tones equally spaced in the 8 MHz of available bandwidth. There are 1280 tones in each Band, and 640 tones in each Sub-band (320 frequencies in the lower band and 320 frequencies in the upper

'369 Patent	Agee 923
	band). The spacing between the tones (Df) is simply 8 MHz divided by 2560 that translates to 3.125 KHz. The tones may be further organized into Tone Sets each with four tones, and Tone Partitions, each with 20 Tone Sets. Alternatively the tones may be organized into Tone Clusters each with 20 tones, and Traffic Partitions, each with 4 Tone Clusters. A traffic channel requires at least one traffic partition." 21:61-22:5 Additionally, Agee 923 discloses that "The organization of the tones also permits standardization of tone assignments to users so as to permit the contemplated calculations in an orderly fashion. For example, each user may be assigned only multiples of traffic partitions." 22:9-13. Agee 923 teaches that for each such "traffic partition" assigned to a "traffic channel" via a "traffic channel index", such "tones" intended in a downlink transmission to a particular subscriber or user are scaled according to a "gain preemphasis vector" corresponding to such "traffic channel index" as shown for example in FIG. 31:

<table>
<tr><th>’369 Patent</th><th>Agee 923</th></tr>
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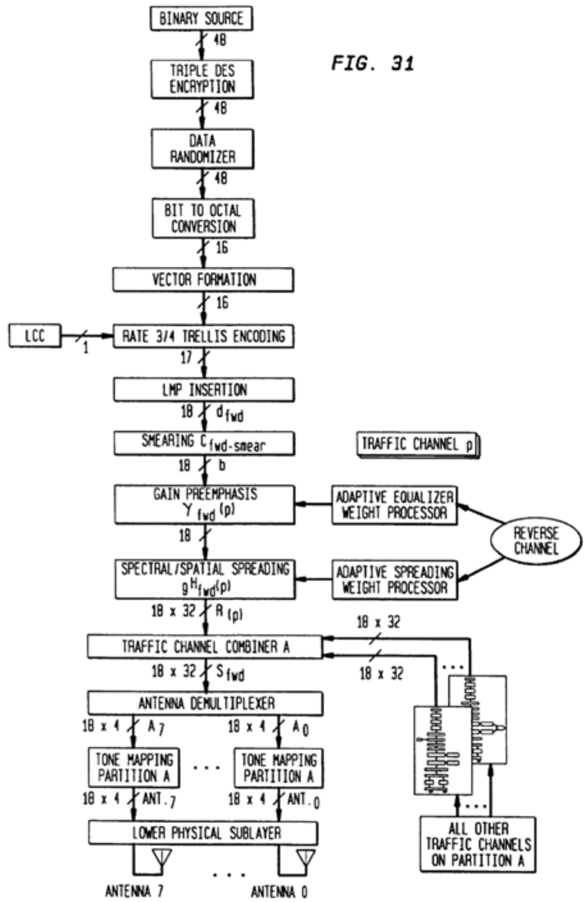

FIG. 31

Note further that Agee 923 teaches as shown in FIG. 31 that this “gain preemphasis vector” and that this “spectral/spatial spreading vector” (each individually or together in combination, an example of a “forward path pre-equalization parameter” in the ‘369 Patent terminology) for the “traffic channel index” (or index “p”) assigned to a particular subscriber or user are determined when “retrodirective adaptive equalization is used to determine the set of weights used in both reception and transmission” and the “optimum transmit weights are calculated based on the signals received at the base station” (i.e. in view of “at least one multipath transmission delay within a
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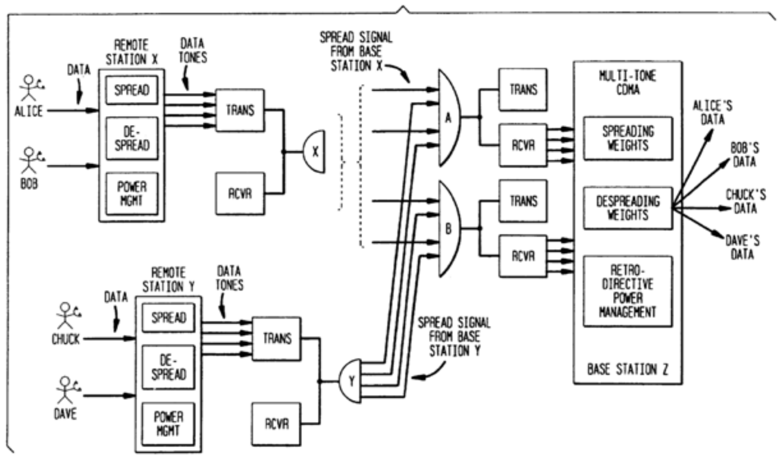
'369 Patent	Agee 923
	reverse path data signal received from a receiving device " in the '369 Patent terminology). See Agee 923 at 40:6-41:58; From FIG. 31 and many other disclosures within Agee 923, it is apparent that application of this "gain preemphasis vector" and/or "spectral/spatial spreading vector" upon the downlink data signal going to multiple subscribers or users necessarily includes both "***modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter***" and "***selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal***" in the '369 Patent terminology. For example, in a section entitled "**Channel Response, Equalization, and Signal Extraction**", Agee 923 explains that a "**channel response vector** is **determined** by transmitting a **pilot signal** and noting its distortion by the channel ("**pilot driven equalization**")" or alternatively, "the **effect of channel response is "equalized"** by simply adaptively calculating a "despread matrix" that maximizes the ratio of signal-to-noise-and-interference associated with the transmitted data (**data driven equalization**)" such that for either example "The **calculated optimum system parameters** may include a mathematical **representation of the channel response**. These **channel response parameters** may then be **used by either the base** or the remote **to "equalize" the channel distortion**." wherein "These **parameters may be used by the either side of the link** because, at least for short periods of time, the channel is reciprocal in time" and "the bandwidth-efficient transmission techniques used in the invention are combined in a **Time Division Duplex (TDD)** configuration". See Agee 17:27-18:9. For example, in a section entitled "**Advantages Associated with DMT-SC**" (note: Agee 923 uses "DMT" or "Discrete Multi Tone" interchangeably with "OFDM" as was customary in that time frame), Agee 923 explains that "the use of DMT-SC allows the **channel characteristics to be evaluated at discrete points** that can be exactly represented in matrix form as a complex vector" such that the "**channel equalization calculation may be subsumed in the calculation of despread/spread weights** that improve or optimize characteristics of the signal such as the signal to noise and interference ratio". Agee 923 at 23:59-25:45.

’369 Patent	Agee 923
	More specifically, Agee 923 teaches that “during the traffic establishment phase, a series of pilot tones having known amplitudes and phases, are transmitted over the entire frequency spectrum” such that “To compensate for the channel distortion, a complex inverse (having an amplitude component and a phase component) of the channel response is calculated and multiplied by the incoming signals”. Agee 923 at 29:50-62. Agee 923 also notes that “it will be appreciated by those skilled in the art” that “the **channel equalization method** used in accordance with the invention is **conceptually separable from other signal weighting and decoding methods of the present invention**”, thereby informing a POSITA that other approaches to determining the “**channel response parameters**” then are “**used by either the base** or the remote **to “equalize” the channel distortion**” are likely to succeed in combination with the disclosures of Agee 923. 30:22-34. For example, in a section entitled “**Reciprocity and Retrodirectivity**”, Agee 923 explains that “the properties of the **air channel between the base and the remote terminals** (i.e., those properties that introduce distortion in the transmitted signal) are **substantially the same for both reception and transmission**. Thus, **substantially the same weights can be used** at a station for both despreading a **signal at reception** and for spreading a **signal at transmission**. In accordance with this retrodirectivity principle, the **base station can perform most of the computation for transmission spreading weights when it computes the despreading weights on reception**”. 30:36-31:33. Agee 923 also teaches a process for setting the base station transmitted “power level” for the OFDM tones (or “traffic channels”) allocated to each remote station in reference to at least FIG. 101:

'369 Patent	Agee 923
	FIG. 101  More specifically, Agee 923 discloses that "The invention enables **control over the power level of signals transmitted by** remote stations and **base stations in a DMT-SS wireless network**" wherein FIG. 101 (also known as FIG. D1B) shows "the **remote station** X transmitting **reverse pilot tones with a prearranged initial reverse signal power level, to the base station Z**. The signal received by the base station Z has a signal power level that is less than the prearranged initial reverse signal power level, the difference being a measure of the channel loss between the base station and the remote station X. The base station stores the value of the channel loss it measures. The base station includes a retrodirective power management unit. The base prepares despreading weights to despread the DMT-SS signals it receives from the remote station X. Then **the base uses the principle of retrodirectivity to compute spreading weights for transmission of DMT-SS signals to the remote station X**. The **spreading weights calculated at the base station include a factor based on the measured channel loss stored at the base station**, to overcome the channel loss so that **forward signals transmitted to the remote station X will arrive there with a desired received signal power level**". Agee 923 at p. 151-152 (Appendix at columns 185-188) Agee 923 notes in reference to the system shown in FIG. 101 above that the "system has a **total of 2560 discrete tones (carriers) equally spaced** in 8 MHz of available bandwidth in the range of

’369 Patent	Agee 923
	1850 to 1990 MHz. The spacing between the tones is 3.125 kHz. The total set of tones are numbered consecutively form 0 to 2559 starting from the lowest frequency tone. The **<u>tones are used to carry traffic messages and overhead messages between the base station and the plurality of remote units</u>**. The traffic tones are **<u>divided into 32 traffic partitions</u>**, with **<u>each traffic channel requiring at least one traffic partition of 72 tones</u>**”. Agee 923 at p. 155-156 (Appendix at columns 193-196) Additionally, Agee 923 notes in this section the use of the “gain preemphasis vector” for the “traffic channel index” (or index “p”) assigned to a particular subscriber or user (as described for FIG. 31). Accordingly, Agee 923 discloses the “**<u>forward channel transmission from a Base to a given Remote Unit</u>** is maintained at a **<u>fixed power level during the duration of a connection</u>**. The power level is **<u>determined by the Base</u>** RME prior to the **<u>start of the connection</u>** using a power management algorithm.” Since every one of the multiple Remote Units has a different path loss, then the OFDM tones transmitted from the Base to a given remote per its assigned traffic channel index has different power levels than those assigned to other remotes. Agee 923 at p. 164 (Appendix at columns 211). One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention

'369 Patent	Agee 923
	document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[a] identifying at least one multipath transmission delay within a reverse path data signal received from a receiving device;	Agee 923 discloses identifying at least one multipath transmission delay within a reverse path data signal received from a receiving device. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p] of Agee 923 teachings of estimating the channel response. Agee 923 teaches that for each such "traffic partition" assigned to a "traffic channel" via a "traffic channel index", such "tones" intended in a downlink transmission to a particular subscriber or user are scaled according to a "gain preemphasis vector" corresponding to such "traffic channel index" as shown for example in FIG. 31:

’369 Patent	Agee 923

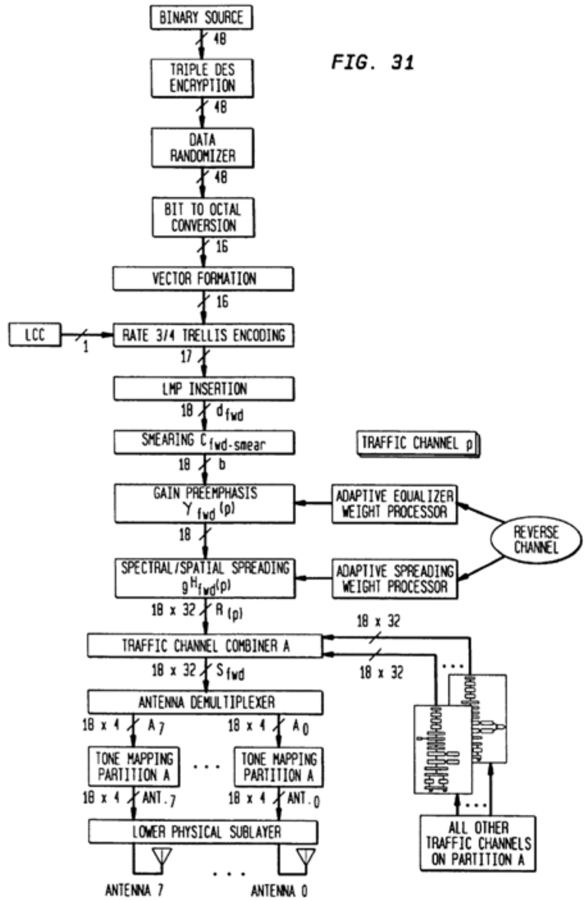


FIG. 31

Note further that Agee 923 teaches as shown in FIG. 31 that this “gain preemphasis vector” and that this “spectral/spatial spreading vector” (each individually or together in combination, an example of a “***forward path pre-equalization parameter***” in the ‘369 Patent terminology) for the “traffic channel index” (or index “p”) assigned to a particular subscriber or user are determined when “retrodirective adaptive equalization is used to determine the set of weights used in both reception and transmission” and the “optimum transmit weights are calculated based on the signals received at the base station” (i.e. in view of “***at least one multipath transmission delay within a***

’369 Patent	Agee 923
	reverse path data signal received from a receiving device” in the ‘369 Patent terminology). See Agee 923 at 40:6-41:58; From FIG. 31 and many other disclosures within Agee 923, it is apparent that application of this “gain preemphasis vector” and/or “spectral/spatial spreading vector” upon the downlink data signal going to multiple subscribers or users necessarily includes both “***modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter***” and “***selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal***” in the ‘369 Patent terminology. For example, in a section entitled “**<u>Channel Response, Equalization, and Signal Extraction</u>**”, Agee 923 explains that a “**<u>channel response vector</u>** is **<u>determined</u>** by transmitting a **<u>pilot signal</u>** and noting its distortion by the channel (“**<u>pilot driven equalization</u>**”)” or alternatively, “the **<u>effect of channel response is “equalized”</u>** by simply adaptively calculating a “despread matrix” that maximizes the ratio of signal-to-noise-and-interference associated with the transmitted data (**<u>data driven equalization</u>**)” such that for either example “The **<u>calculated optimum system parameters</u>** may include a mathematical **<u>representation of the channel response</u>**. These **<u>channel response parameters</u>** may then be **<u>used by either the base</u>** or the remote **<u>to “equalize” the channel distortion</u>**.” wherein “These **<u>parameters may be used by the either side of the link</u>** because, at least for short periods of time, the channel is reciprocal in time” and “the bandwidth-efficient transmission techniques used in the invention are combined in a **<u>Time Division Duplex (TDD)</u>** configuration”. See Agee 17:27-18:9. For example, in a section entitled “**<u>Advantages Associated with DMT-SC</u>**” (note: Agee 923 uses “DMT” or “Discrete Multi Tone” interchangeably with “OFDM” as was customary in that time frame), Agee 923 explains that “the use of DMT-SC allows the **<u>channel characteristics to be evaluated at discrete points</u>** that can be exactly represented in matrix form as a complex vector” such that the “**<u>channel equalization calculation may be subsumed in the calculation of despread/spread weights</u>** that improve or optimize characteristics of the signal such as the signal to noise and interference ratio”. Agee 923 at 23:59-25:45.

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	More specifically, Agee 923 teaches that “during the traffic establishment phase, a series of pilot tones having known amplitudes and phases, are transmitted over the entire frequency spectrum” such that “To compensate for the channel distortion, a complex inverse (having an amplitude component and a phase component) of the channel response is calculated and multiplied by the incoming signals”. Agee 923 at 29:50-62. Agee 923 also notes that “it will be appreciated by those skilled in the art” that “the **channel equalization method** used in accordance with the invention is **conceptually separable from other signal weighting and decoding methods of the present invention**”, thereby informing a POSITA that other approaches to determining the “**channel response parameters**” then are “**used by either the base** or the remote **to “equalize” the channel distortion**” are likely to succeed in combination with the disclosures of Agee 923. 30:22-34. For example, in a section entitled “**Reciprocity and Retrodirectivity**”, Agee 923 explains that “the properties of the **air channel between the base and the remote terminals** (i.e., those properties that introduce distortion in the transmitted signal) are **substantially the same for both reception and transmission**. Thus, **substantially the same weights can be used** at a station for both despreading a **signal at reception** and for spreading a **signal at transmission**. In accordance with this retrodirectivity principle, the **base station can perform most of the computation for transmission spreading weights when it computes the despreading weights on reception**”. 30:36-31:33. See Figure 5 (channel response); See 29:49-30:34 (describing process of using pilot signals to estimate channel response to be used for OFDM subcarrier modifications); See 60:66-61:16 (estimate characteristics and response of the multipath channel); Pg. 120 (columns 123-124) (use of pilot tones to help determine channel response);

’369 Patent	Agee 923
	Pg 137 (columns 157-158) (use of pilot tones to help determine channel response); See Figures 33, 35 (using the adaptive equalizer weight processor based on the reverse channel to calculate the gain preemphasis); See 40-65 - 41:59; See 50:61-51:35 (calculation of weights) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[b] determining at least one forward path pre-equalization parameter based on said at least one transmission delay; and	Agee 923 discloses determining at least one forward path pre-equalization parameter based on said at least one transmission delay. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], 1[a] of Agee 923 teachings of estimating the channel response by using the receive weights and calculating the gain preemphasis vector. Agee 923 teaches that for each such “traffic partition” assigned to a “traffic channel” via a “traffic channel index”, such “tones” intended in a downlink transmission to a particular subscriber or user

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are scaled according to a “gain preemphasis vector” corresponding to such “traffic channel index” as shown for example in FIG. 31:

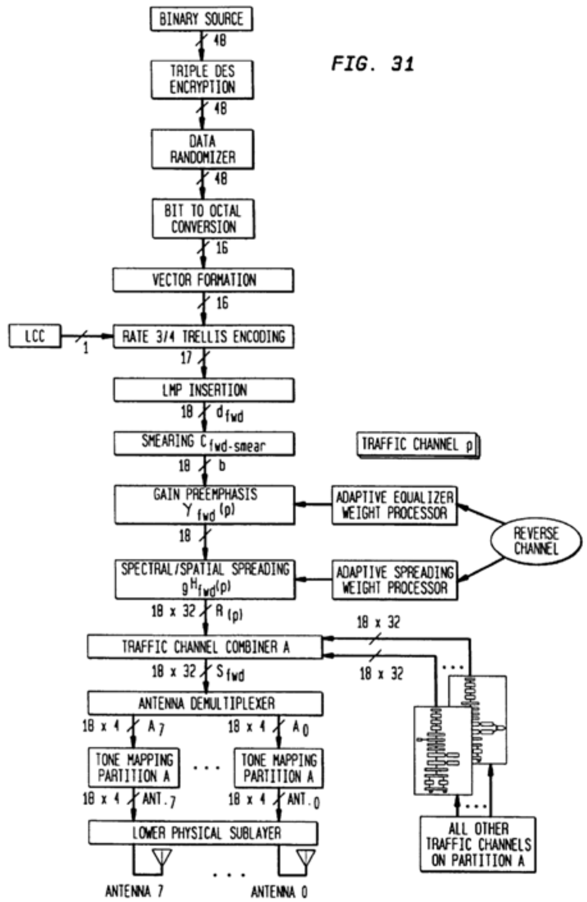

FIG. 31

Note further that Agee 923 teaches as shown in FIG. 31 that this “gain preemphasis vector” and that this “spectral/spatial spreading vector” (each individually or together in combination, an example of a “***forward path pre-equalization parameter***” in the ‘369 Patent terminology) for the “traffic channel index” (or index “p”) assigned to a particular subscriber or user are determined

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’369 Patent	Agee 923
	when “retrodirective adaptive equalization is used to determine the set of weights used in both reception and transmission” and the “optimum transmit weights are calculated based on the signals received at the base station” (i.e. in view of “***at least one multipath transmission delay within a reverse path data signal received from a receiving device***” in the ‘369 Patent terminology). See Agee 923 at 40:6-41:58; From FIG. 31 and many other disclosures within Agee 923, it is apparent that application of this “gain preemphasis vector” and/or “spectral/spatial spreading vector” upon the downlink data signal going to multiple subscribers or users necessarily includes both “***modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter***” and “***selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal***” in the ‘369 Patent terminology. For example, in a section entitled “**Channel Response, Equalization, and Signal Extraction**”, Agee 923 explains that a “**channel response vector** is **determined** by transmitting a **pilot signal** and noting its distortion by the channel (“**pilot driven equalization**”)” or alternatively, “the **effect of channel response is “equalized”** by simply adaptively calculating a “despread matrix” that maximizes the ratio of signal-to-noise-and-interference associated with the transmitted data (**data driven equalization**)” such that for either example “The **calculated optimum system parameters** may include a mathematical **representation of the channel response**. These **channel response parameters** may then be **used by either the base** or the remote **to “equalize” the channel distortion**.” wherein “These **parameters may be used by the either side of the link** because, at least for short periods of time, the channel is reciprocal in time” and “the bandwidth-efficient transmission techniques used in the invention are combined in a **Time Division Duplex (TDD)** configuration”. See Agee 17:27-18:9. For example, in a section entitled “**Advantages Associated with DMT-SC**” (note: Agee 923 uses “DMT” or “Discrete Multi Tone” interchangeably with “OFDM” as was customary in that time frame), Agee 923 explains that “the use of DMT-SC allows the **channel characteristics to be evaluated at discrete points** that can be exactly represented in matrix form as a complex vector”

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	such that the “**<u>channel equalization calculation may be subsumed in the calculation of despread/spread weights</u>** that improve or optimize characteristics of the signal such as the signal to noise and interference ratio”. Agee 923 at 23:59-25:45. See Figures 33 and 35 (using gain preemphasis vector); See 35:25-37; See 36:13-59; See 37:18-49; See 60:56-61:24. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
1[c] modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter, where	Agee 923 discloses modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter, where said modifying includes selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal. For example, see the following passages and/or figures, as well as all related disclosures:

Exhibit E-4

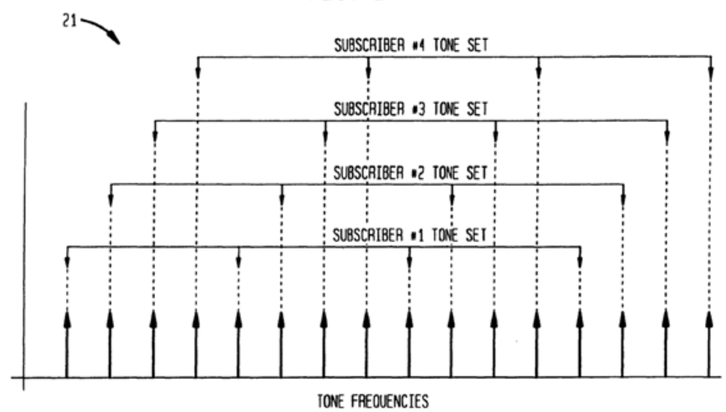
’369 Patent	Agee 923
said modifying includes selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal.	See discussion in 1[p], 1[a] of Agee 923 teachings of estimating the channel response by using the receive weights and calculating the gain preemphasis vector which is then used to modify the power for the OFDM tones. See 24:40-48; See 29:39-47. Agee 923 discloses a system in which a base station uses the reverse data signal to estimate the channel. Based on that estimate, Agee 923 adjusts the power levels of OFDM subcarriers transmitted to other devices such as subscriber devices on the downlink / forward channel. Agee 923 describes an OFDMA system with different tones assigned to different subscribers, for example: FIG. 2 

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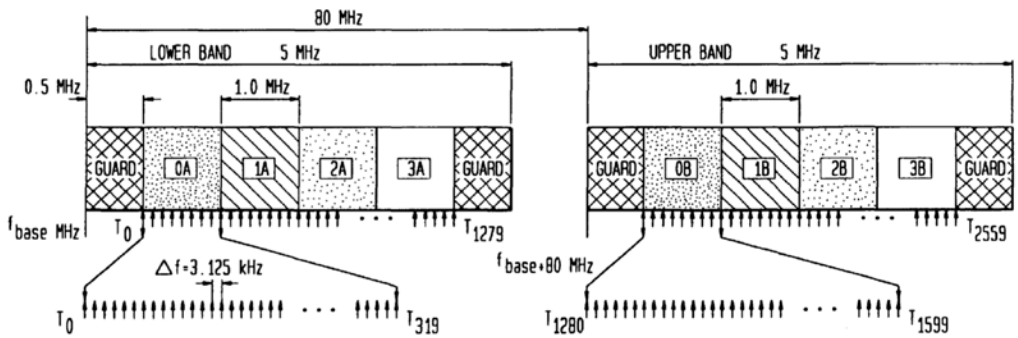
FIG. 19


In reference to the example in FIG. 19, Agee 923 discloses that "there are a total of 2560 frequency tones equally spaced in the 8 MHz of available bandwidth. There are 1280 tones in each Band, and 640 tones in each Sub-band (320 frequencies in the lower band and 320 frequencies in the upper band). The spacing between the tones (Df) is simply 8 MHz divided by 2560 that translates to 3.125 KHz. The tones may be further organized into Tone Sets each with four tones, and Tone Partitions, each with 20 Tone Sets. Alternatively the tones may be organized into Tone Clusters each with 20 tones, and Traffic Partitions, each with 4 Tone Clusters. A traffic channel requires at least one traffic partition." 21:61-22:5

Additionally, Agee 923 discloses that "The organization of the tones also permits standardization of tone assignments to users so as to permit the contemplated calculations in an orderly fashion. For example, each user may be assigned only multiples of traffic partitions." 22:9-13.

Agee 923 teaches that for each such "traffic partition" assigned to a "traffic channel" via a "traffic channel index", such "tones" intended in a downlink transmission to a particular subscriber or user are scaled according to a "gain preemphasis vector" corresponding to such "traffic channel index" as shown for example in FIG. 31:
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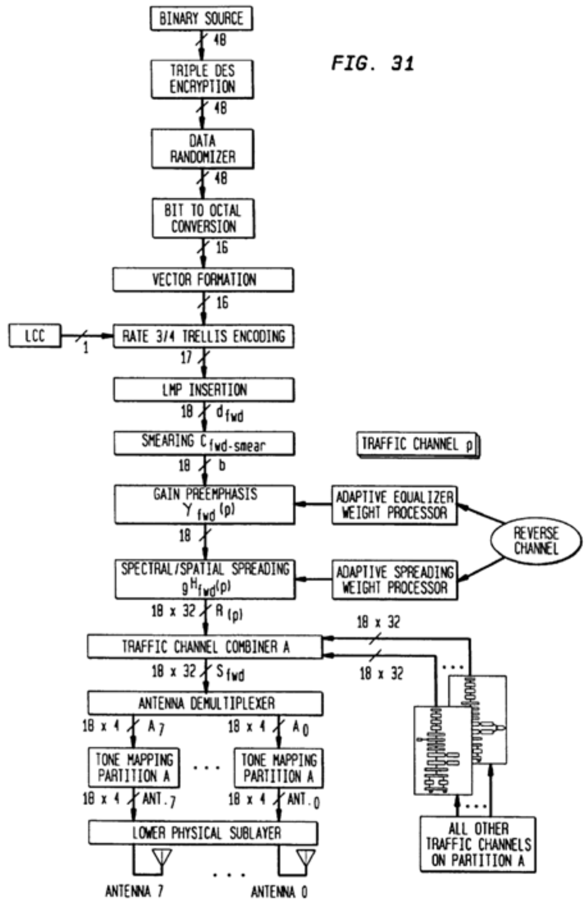
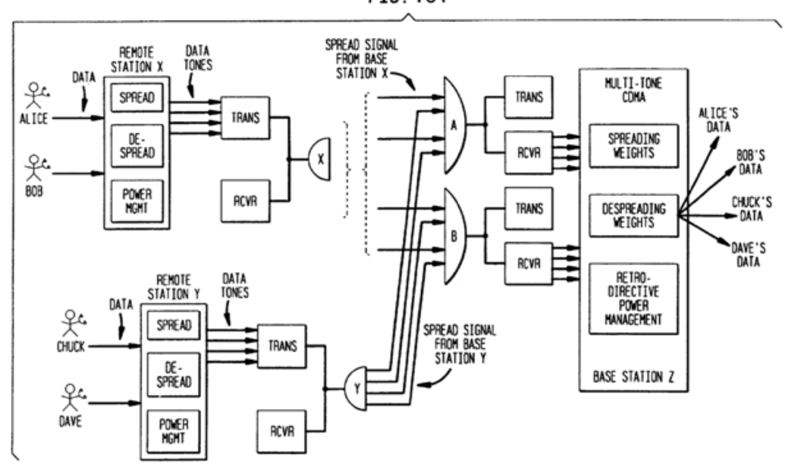
	FIG. 31  Note further that Agee 923 teaches as shown in FIG. 31 that this “gain preemphasis vector” and that this “spectral/spatial spreading vector” (each individually or together in combination, an example of a “***forward path pre-equalization parameter***” in the ‘369 Patent terminology) for the “traffic channel index” (or index “p”) assigned to a particular subscriber or user are determined when “retrodirective adaptive equalization is used to determine the set of weights used in both reception and transmission” and the “optimum transmit weights are calculated based on the signals received at the base station” (i.e. in view of “***at least one multipath transmission delay within a***

'369 Patent	Agee 923
	reverse path data signal received from a receiving device " in the '369 Patent terminology). See Agee 923 at 40:6-41:58; From FIG. 31 and many other disclosures within Agee 923, it is apparent that application of this "gain preemphasis vector" and/or "spectral/spatial spreading vector" upon the downlink data signal going to multiple subscribers or users necessarily includes both "***modifying a forward path data signal that is to be transmitted to the receiving device based on said at least one forward path pre-equalization parameter***" and "***selectively setting different transmission power levels for at least two Orthogonal Frequency Division Multiplexing (OFDM) tones in said forward path data signal***" in the '369 Patent terminology. For example, in a section entitled "**<u>Channel Response, Equalization, and Signal Extraction</u>**", Agee 923 explains that a "**<u>channel response vector</u>** is **<u>determined</u>** by transmitting a **<u>pilot signal</u>** and noting its distortion by the channel ("**<u>pilot driven equalization</u>**")" or alternatively, "the **<u>effect of channel response is "equalized"</u>** by simply adaptively calculating a "despread matrix" that maximizes the ratio of signal-to-noise-and-interference associated with the transmitted data (**<u>data driven equalization</u>**)" such that for either example "The **<u>calculated optimum system parameters</u>** may include a mathematical **<u>representation of the channel response</u>**. These **<u>channel response parameters</u>** may then be **<u>used by either the base</u>** or the remote **<u>to "equalize" the channel distortion</u>**." wherein "These **<u>parameters may be used by the either side of the link</u>** because, at least for short periods of time, the channel is reciprocal in time" and "the bandwidth-efficient transmission techniques used in the invention are combined in a **<u>Time Division Duplex (TDD)</u>** configuration". See Agee 17:27-18:9. For example, in a section entitled "**<u>Advantages Associated with DMT-SC</u>**" (note: Agee 923 uses "DMT" or "Discrete Multi Tone" interchangeably with "OFDM" as was customary in that time frame), Agee 923 explains that "the use of DMT-SC allows the **<u>channel characteristics to be evaluated at discrete points</u>** that can be exactly represented in matrix form as a complex vector" such that the "**<u>channel equalization calculation may be subsumed in the calculation of despread/spread weights</u>** that improve or optimize characteristics of the signal such as the signal to noise and interference ratio". Agee 923 at 23:59-25:45.

’369 Patent	Agee 923
	Agee 923 also notes that “it will be appreciated by those skilled in the art” that “the **channel equalization method** used in accordance with the invention is **conceptually separable from other signal weighting and decoding methods of the present invention**”, thereby informing a POSITA that other approaches to determining the “**channel response parameters**” then are “**used by either the base** or the remote **to “equalize” the channel distortion**” are likely to succeed in combination with the disclosures of Agee 923. 30:22-34. Agee 923 also teaches a process for setting the base station transmitted “power level” for the OFDM tones (or “traffic channels”) allocated to each remote station in reference to at least FIG. 101: FIG. 101  More specifically, Agee 923 discloses that “The invention enables **control over the power level of signals transmitted by** remote stations and **base stations in a DMT-SS wireless network**” wherein FIG. 101 (also known as FIG. D1B) shows “the **remote station** X transmitting **reverse pilot tones with a prearranged initial reverse signal power level, to the base station Z**. The signal received by the base station Z has a signal power level that is less than the prearranged initial reverse signal power level, the difference being a measure of the channel loss between the base

’369 Patent	Agee 923
	station and the remote station X. The base station stores the value of the channel loss it measures. The base station includes a retrodirective power management unit. The base prepares despreading weights to despread the DMT-SS signals it receives from the remote station X. Then **the base uses the principle of retrodirectivity to compute spreading weights for transmission of DMT-SS signals to the remote station X**. The **spreading weights calculated at the base station include a factor based on the measured channel loss stored at the base station**, to overcome the channel loss so that **forward signals transmitted to the remote station X will arrive there with a desired received signal power level**”. Agee 923 at p. 151-152 (Appendix at columns 185-188) Agee 923 notes in reference to the system shown in FIG. 101 above that the “system has a **total of 2560 discrete tones (carriers) equally spaced** in 8 MHz of available bandwidth in the range of 1850 to 1990 MHz. The spacing between the tones is 3.125 kHz. The total set of tones are numbered consecutively form 0 to 2559 starting from the lowest frequency tone. The **tones are used to carry traffic messages and overhead messages between the base station and the plurality of remote units**. The traffic tones are **divided into 32 traffic partitions**, with **each traffic channel requiring at least one traffic partition of 72 tones**”. Agee 923 at p. 155-156 (Appendix at columns 193-196) Additionally, Agee 923 notes in this section the use of the “gain preemphasis vector” for the “traffic channel index” (or index “p”) assigned to a particular subscriber or user (as described for FIG. 31). Accordingly, Agee 923 discloses the “**forward channel transmission from a Base to a given Remote Unit** is maintained at a **fixed power level during the duration of a connection**. The power level is **determined by the Base** RME prior to the **start of the connection** using a power management algorithm.” Since every one of the multiple Remote Units has a different path loss, then the OFDM tones transmitted from the Base to a given remote per its assigned traffic channel index has different power levels than those assigned to other remotes. Agee 923 at p. 164 (Appendix at columns 211). See Figure 24 (explain tones across subbands);

’369 Patent	Agee 923
	See Figure 90 (showing modification of tones); See Figures 2-3; 15:28-16:11 (user’s tones are weighted); 17:2-15; See 22:1-55 (tones with weights based on the adaptive equalization); See 27:16-29 (tones are adjusted with weights to alter amplitude and phase of the tone); See Figure 10; See 27:30-55; See 32:61-35:8 (format and allocation of tones to remote users and uplink/downlink channels) See Figure 32 (showing structure of channel gain preemphasis vector); See Figures 33-35 (using gain preemphas vector to modify tones); See 35:10-51 (describing use of gain preemphasis vector to modify tones that are transmitted by the antennas of the base station for “high capacity mode”) See 35:59-36:51 (describing use of gain preemphasis vector to modify tones that are transmitted by the antennas of the base station for “high capacity mode”): See 36:60-37:49 (describing use of gain preemphasis vector to modify tones that are transmitted by the antennas of the base station for “low capacity mode”): See P. 157-158 (describing use of gain preemphasis vector to modify tones that are transmitted by the antennas of the base station).

’369 Patent	Agee 923
	One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
2. The method as recited in claim 1, further comprising: receiving said reverse path data signal over at least one reverse transmission path.	Agee 923 discloses receiving said reverse path data signal over at least one reverse transmission path. For example, see the following passages and/or figures, as well as all related disclosures: See the discussion in 1[p], 1[a] regarding Agee 923 receipt at the base station of signals from the subscriber units and use of those signals to generate the weights reflecting the channel estimation and the gain preemphasis vector. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

’369 Patent	Agee 923
3. The method as recited in claim 2, further comprising: transmitting said modified forward path data signal over at least one forward transmission path.	Agee 923 discloses transmitting said modified forward path data signal over at least one forward transmission path. For example, see the following passages and/or figures, as well as all related disclosures: See the discussion in 1[p], 1[b], 1[c] regarding Agee 923 transmission of the modified tones to the subscriber units from the base stations over the forward path (downlink to the subscriber remote units). One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
4. The method as recited in claim 1, wherein said reverse path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.	Agee 923 discloses wherein said reverse path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data. For example, see the following passages and/or figures, as well as all related disclosures: See the discussion in 1[p], 1[b], 1[c] regarding Agee 923 use of OFDM on both uplink (reverse) and downlink (forward path) using, for example, the allocation of tones on both forward and reverse links.

’369 Patent	Agee 923
	See Figure 68 (showing tone mapping); 52:65-53:24 (“The transmitter for the lower physical layer of this embodiment is functionally described by the block diagram in FIG. 68. The lower physical layer functionality is identical in forward and reverse channels.”); See Figures 47, 48, 51 showing QPSK encoding; 11:32-43; 37:11-16 (“maps the encoded symbol to the corresponding QPSK signal constellation point…. Within the set of QPSK constellation signals”); 39:16-229; 41:60-42:3; 44:16-23; 48:3-29 (all showing QPSK usage); One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and QPSK Usage references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
5. The method as recited in claim 1, wherein said modified forward path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data.	Agee 923 discloses The method as recited in claim 1, wherein said modified forward path data signal includes at least one type of data selected from a group of different types of data comprising Orthogonal Frequency Division Multiplexing (OFDM) data and Quadrature Phase Shift Keying (QPSK) data. For example, see the following passages and/or figures, as well as all related disclosures: See citations for claim 4. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with

’369 Patent	Agee 923
	the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the OFDM Tone Modification and QPSK Usage references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
6. The method as recited in claim 5, wherein said modified forward path data signal includes sub-carrier pre-equalized OFDM data.	Agee 923 discloses wherein said modified forward path data signal includes sub-carrier pre-equalized OFDM data. For example, see the following passages and/or figures, as well as all related disclosures: See discussion of 1[p], 1[c] and use of gain preemphasis vector to modify tones / subcarrier OFDM data. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
7. The method as recited in claim 6, further comprising: generating corresponding Quadrature	Agee 923 discloses generating corresponding Quadrature Phase Shift Keying (QPSK) modulation values based on said sub-carrier pre-equalized OFDM data. For example, see the following passages and/or figures, as well as all related disclosures:

’369 Patent	Agee 923
Phase Shift Keying (QPSK) modulation values based on said sub-carrier pre-equalized OFDM data.	See citations and discussion for claims 4, 5 One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the OFDM Tone Modification and QPSK Usage references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
9. The method as recited in claim 1, wherein said reverse path data signal includes identifiable training data.	Agee 923 discloses The method as recited in claim 1, wherein said reverse path data signal includes identifiable training data. For example, see the following passages and/or figures, as well as all related disclosures: Agee 923 discloses the use of a reverse channel pilot signal. The pilot tones transmitted by Agee 932 are a “known training signal.” 30:7-8. See Figure 101 and associated description. 13:46-50 (“FIG. 101 is an architectural diagram of the personal wireless access network (PWAN) of FIG. 100, showing the remote station X transmitting reverse pilot tones with a prearranged initial reverse signal power level, to the base station Z.”); 17:43-45 (“In an embodiment of the invention, this channel response vector is determined by transmitting a pilot signal and noting its distortion by the channel (“pilot driven equalization”).”). 29:50-62 (“In one embodiment of the present invention, during the traffic establishment phase, a series of pilot tones having known amplitudes and phases, are transmitted over the entire frequency spectrum. The pilot tones are at a known level (e.g., 0 dB), and are spaced apart by approximately

’369 Patent	Agee 923
	30 KHz to provide an accurate representation of the channel response (i.e., the amplitude and phase distortion introduced by the communication channel characteristics) over the entire transmission band. To compensate for the channel distortion, a complex inverse (having an amplitude component and a phase component) of the channel response is calculated and multiplied by the incoming signals. This initializes the weights during the traffic establishment phase.”). 23:64-67 (“Thus, because selected tones within each tone set can be designated as pilots distributed throughout the frequency band, a simple evaluation of a finite number of complex values results in an accurate channel estimation.”); See 13:46-51; See Figure 64; 51:36-65 (“Reverse Control Channel Transmission Format The block diagram for the physical layer of the solicited and unsolicited Common Access Channel (CAC) channel transmissions is shown in FIG. 64. A CAC message is a 56-bit binary sequence composed of a training sequence, information bits, and CRC parity bits. The vector formation block converts the binary sequence into a (56×1) vector….”) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and Training Data references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
10. The method as recited in claim 9, further	Agee 923 discloses comparing said identifiable training data to a local version of said training data to identify said at least one multipath transmission delay within said reverse path data signal.

’369 Patent	Agee 923
comprising: comparing said identifiable training data to a local version of said training data to identify said at least one multipath transmission delay within said reverse path data signal.	For example, see the following passages and/or figures, as well as all related disclosures: See citations and discussion for claim 9. The pilot signals are “known” which corresponds to a local version of said training data. See 29:50-62 (pilot tones having known amplitudes and phases and levels); 78:66-67; 79:28-30. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and Training Data references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
12. The method as recited in claim 3, wherein said at least one reverse transmission path is substantially reciprocal to said at least one forward transmission path.	Agee 923 discloses wherein said at least one reverse transmission path is substantially reciprocal to said at least one forward transmission path. For example, see the following passages and/or figures, as well as all related disclosures: See discussion of 1[p], 1[a], 1[b] describing that the base station is a transmitting device (e.g., for the downlink OFDM symbols) and that it also determines the pre-equalization parameter and performs the modification of the forward path (downlink) data signal based on the reverse link. The use of the reverse link channel conditions in Agee 923 to adapt the forward path transmissions discloses this claim.

’369 Patent	Agee 923
	Agee 923 discloses TDD and using reverse path channel response to predict forward path channel response, which a POSITA would understand to necessarily disclose the limitations of this claim element and Agee 923 expressly relies on the reciprocal nature of the channel. E.g., Agee 923 at 17:55-65 30:36-31:34; 18:25-67. Indeed, the ‘369 acknowledges that reciprocity was already well-known prior to the ‘369 patent, particularly for TDD channels. See ‘369 patent at 7:22-34 (“**<u>As is well known</u>**, many materials are electromagnetically isotropic, which is a property resulting from symmetry in their associated permittivity and permeability tensors. The Lorentz Reciprocity Theorem applies to such materials. Refraction and dielectric reflection from materials therefore often show reciprocity, or equivalence of forward and reverse channel characteristics. Diffraction and reflection are inherently reciprocal due to the minimal media affecting the electromagnetic wave. Thus, reciprocity can be used to determine channel characteristics that are used while pre-equalizing a transmitted path. The use of a reciprocal channel is very useful, for example, when Time Division Duplex (TDD) channels are implemented.”). One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.

'369 Patent	Agee 923
13. The method as recited in claim 1, wherein identifying said at least one multipath transmission delay, determining said at least one forward path pre-equalization parameter, and modifying said forward path data signal are performed by a transmitting device.	Agee 923 discloses wherein identifying said at least one multipath transmission delay, determining said at least one forward path pre-equalization parameter, and modifying said forward path data signal are performed by a transmitting device. For example, see the following passages and/or figures, as well as all related disclosures: See the discussion in 1[p], 1[b], 1[c] regarding Agee 923 transmission of the modified tones to the subscriber units from the base stations over the forward path (downlink to the subscriber remote units). The base stations are transmitting devices. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
14. The method as recited in claim 13, wherein said transmitting device includes a base station device that is operatively configured for use in a wireless communication system.	Agee 923 discloses wherein said transmitting device includes a base station device that is operatively configured for use in a wireless communication system. For example, see the following passages and/or figures, as well as all related disclosures: See claim 13. The base stations are transmitting devices. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to

’369 Patent	Agee 923
	teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
15. The method as recited in claim 13, further comprising: using at least one transmitting device receive antenna operatively coupled to said transmitting device to receive said reverse path data signal over at least one reverse transmission path from the receiving device.	Agee 923 discloses using at least one transmitting device receive antenna operatively coupled to said transmitting device to receive said reverse path data signal over at least one reverse transmission path from the receiving device. For example, see the following passages and/or figures, as well as all related disclosures: See claim 15. The base stations are transmitting devices with receive antennas. Agee 923 discloses many different types of antennas used for receiving and transmitting data. See Figures 6, 7, 13, 31, 32, 33, 34, 35, 36, 49, 50, 52, 54 (all showing 8 antennas), 72, 73, 80. See discussion of “antenna 120” throughout the entire discussion. See claims 16, 18, 26, 28 (claiming “antenna array” for “receiving” and “transmitting” at the “base station”); See Abstract (“The basic method may be extended to include multielement antenna array nulling methods for interference cancellation and enhanced signal separation using spatial separation.”); 2:42-51 (“The Space Division Multiple Access (SDMA) transmission protocol involves the formation of directed beams of energy, whose radiation patterns do not overlap spatially with each other, to communicate with users at different locations. Adaptive antenna arrays can be driven in

’369 Patent	Agee 923
	phased patterns to simultaneously steer energy in the direction of selected receivers. With such a transmission technique, the other multiplexing schemes can be reused in each of the separately directed beams. For example, the same specific CDMA codes can be used in two different spatially separated beams. Accordingly, if the beams do not overlap each other, different users can be assigned the same code as long as they can be uniquely identified by a specific beam/code combination.”) See 7:19-36 (describing an antenna array) (“One aspect of the invention is a method of communicating signals from at least two different spatially separated remote transmitters to a receiving base station having a multi-element antenna array. Each of the transmitters transmits signals representative of different information. In accordance with this aspect of the invention, the mathematical representation of the spectral characteristics of the signals is capable of being put in a mathematical form that is substantially the same as the mathematical representation of the spatial characteristics of signals received by a multi-element antenna array. This enables the receiver to efficiently process the received signals to simultaneously obtain adaptive spectral and spatial despreading and spreading weights that enhance the signal to noise and interference ratio of the signals. The receiver can then identify the data associated with each of the signals transmitted by the transmitters and can forward that data to the respective recipients. The term “spreading gains” can be used instead of “spreading weights’, to emphasize the meaning that their values are adaptive and can vary in magnitude.”) 9:9-17 (“In one aspect of the invention, applicants show that spreading a signal over a set of weighted tones in DMT-SC is one multiple-access spectral-processing format that resembles the format of data that is processed by a multi-element adaptive antenna array. Accordingly, in an embodiment of the invention, space division multiple access (SDMA) using multi-element adaptive antenna array techniques is combined with DMT-SC to obtain significant calculational advantages.”) 14:26-40 (“This invention is based, in part, on the realization that there is an analogy between the mathematical description of beams formed by multi-element adaptive, or phased, antenna arrays and the mathematical description of signals that are formatted according to certain multiple access

’369 Patent	Agee 923
	schemes, such as the exemplary DMT-SC. Based on this realization, applicants have been able to simplify the calculations necessary when a plurality of multiple access techniques are combined. Using this invention, one may more effectively use a limited bandwidth region of the electromagnetic spectrum to service a large number of users. Techniques that may be combined in accordance with the teachings of this invention include SDMA using multi-element antenna arrays, DMT-SC, and higher order modulation formats such as higher order QAM.”) 17:2-15 (“An important aspect of the invention involves the realization that the mathematical description of a certain processed spectrally processed signals, such as DMT-SC signals, is analogous to the mathematical description of a signal spatially processed by a multi-element adaptive antenna array. Accordingly, the mathematical description of such spectrally processed signals may simultaneously describe spatial processing by a multi-element adaptive antenna array by simply increasing the size of the DMT-SC matrix to take into account the number of antenna elements in the antenna array. The dimensionality of the combined “spectral/spatial matrix” that comprises the spreading weights by which each tone is multiplied, is then equal to the number of tones multiplied by the number of energized antenna elements.”) 24:64-25:15 (“Finally, DMT-SC is advantageous as applied to a multi-element antenna array system where matrix calculations comprise the bulk of the processing operations. As is well known in the art, as the dimensionality of a matrix grows, the calculation operations necessary to invert the covariant matrix increases as the cube of the matrix dimensionality. Thus, the processing power increases as the cube of the matrix dimensionality and, consequently, so does the cost of the processing circuitry. Thus, in order to avoid skyrocketing costs, it is advantageous to limit the dimensionality of the matrices used to perform the spreading and despreading calculations. Since in a multi-element antenna array system it is sometimes desirable to change the number of antenna sensor elements to enhance the beam forming capability of the system, such a system would normally incur an increase in matrix dimensionality (since each sensor corresponds to an element in the matrix). However, in a DMT-SC system, if sensors are added to the antenna array, the dimensionality of the matrix can be preserved by reducing the number of tones in each tone set.”) Agee 923 discloses beam forming using the antenna array.

’369 Patent	Agee 923
	25:45-26:9 (“Beam Forming In accordance with one aspect of the present invention, adaptive antenna arrays are used in conjunction with a beam forming algorithm to achieve spatial diversity within each spatial cell and implement SDMA. That is, signals output by the antennas are directionally formed by selectively energizing different antenna sensors with different signal gains so that remote terminals in one portion of a spatial cell are able to communicate with the base station while other remote terminals in a different portion of the spatial cell may communicate with the same base station, even if they are using the same tone set and code. It should be understood that in the fixed implementation of the current invention, i.e., where the remote access terminals do not move substantially during communication with the base station, usually staying within a spatial cell during communication, the beam forming algorithm used in the airlink need not account for mobile remote units leaving and entering the spatial cell. In one advantageous embodiment, each spatial cell is partitioned into four sectors where each sector transmits and receives over one of the four sub-band pairs. As set forth above, the beam forming method of the present invention, like the use of codes, should not be conceived as separate from the overall adaptive equalization method of the present invention. Rather, the method used to selectively energize the antenna sensors (during transmission) or selectively weight the signals received on the different sensor elements (during reception) is subsumed into the overall method used to maximize SINR. The relation of the beam forming method to the overall maximization of SINR method will be described in greater detail below.”); See 77:55-80:10 and Figures 84A, 84B, 85A, 85B describing the adaptive beamforming. 27:62-28:21 (“As depicted in FIG. 13, a first beam, “beam A,” is directed by the antenna 120 using beam-forming techniques, over a particular spatial region (i.e., the signal strength is significant in the depicted region enclosed by solid lines). A second beam, “beam B,” is directed by the antenna 120 over a different spatial region (enclosed by the dashed line in FIG. 13). Both signals include sidebands, that normally would generate interference within the adjacent signal space, and null regions between the main beam and the sidebands. Of course, it will be appreciated that more complicated beam patterns may be employed having several sidebands and null regions….”)

’369 Patent	Agee 923
	66:4-35 (“The operation of a base station is substantially similar to the operation of the radio access station 187, 192. Specifically, the transmit/receive switch 400 switches the antenna array 120 into the down-converter 405. … The transmit/receive switch 400 is then switched to connect the up converter 407 to the antenna array 120 so that the modulated and encoded data signal is transmitted via the antenna 120.”); 67:20-38 (“FIGS. 79A-79D are a schematic block diagram that depicts the overall digital signal processing architecture layout within the base stations 110. The base station 110 is laid out into a radio frequency chassis portion 2500 and a digital chassis portion 2510. The multiple element antenna array 120, that for ease of illustration is depicted in FIGS. 79A-79D as comprising four antennas, connects to corresponding transmit/receive modules 2512. Each transmit/receive module 2512 includes the transmit/receive switch 400, as well as a receiver, a transmitter, and an amplifier. It should be noted that in accordance with one advantageous aspect of the present invention, each antenna element is provided with an individual amplifier. By using this distributed amplifier configuration instead of one large amplifier to power the entire antenna array, power is saved. In addition, in the event of amplifier failure, only one of multiple antenna elements fails rather than the entire antenna array. Thus, the present invention provides for graceful degradation of signal quality in the event of an amplifier failure.”) 68:12-24 (“The probe antenna path acts like a remote station so that when the base station 110 is transmitting from the antenna array 120, this information is received on the probe 2565. Conversely, when the probe antenna 2565 is transmitting, the antenna array 120 of the base station 110 is receiving the known signal transmitted by the probe antenna 2565.”) 68:30-65 (“FIGS. 6 and 7 show alternative embodiments of the directional antenna arrays 120 that may be used in the system of the present invention. A first embodiment of the base station antenna implementation is designated generally as 120 a. The antenna 120 a is a circular patch slot array antenna including a protective RADOME 505 available from RADIX Technologies, Inc. of Mountain View, Calif., a generally cylindrical housing 507, and a support pole 510. A plurality of multi-element vertical patch arrays 515 are depicted in cutaway in FIG. 6. Each of the patch arrays 515 are capable of directionally emitting radio frequency signals so as to provide beam forming

'369 Patent	Agee 923
	capabilities necessary for the proper implementation of the present invention. In one embodiment, the height of the cylindrical portion 507 is approximately 18″, while the diameter of the RADOME 505 is approximately 5-16″. In one advantageous embodiment, the antenna 120 a includes a vertical stack of 4 microstrip patch antennas. Four of these stacks will respectively be oriented to cover four 90° quadrants. Thus, a total of 16 circumferential stacks of microstrip flared-notch antennas (where each vertical stack comprises eight notches) will be included on the base antenna 120 a. For both the remote and base antennas, the preferred sensor element spacing is one-half wavelength. FIG. 7 depicts a second implementation of the base station antenna of the present invention that is generally designated as 120 b. The antenna 120 b includes a RADOME 520, a generally cylindrical portion 525, and a support pole 530. The RADOME 520 is approximately 18-24″ in diameter while the cylindrical portion 525 is approximately 14″ in height. As shown in cutaway, the antenna 120 b includes a flared circular horn configuration 535 as well as a plurality of monopole transmission elements 540. The monopole elements 540 may be used for beam forming purposes such- as that that is necessary for the optimum operation of the present invention.") 78:33-49 ("At the receiving station, each tone received by the multi-element antenna array is spatially despread in a process analogous to receive beamforming. The resultant signals are then combined. A first method of signal-combining is equal gain combining, where the signals are added together. An alternate method of signal combining is maximal ration combining, where the output signal is chosen from the two tones having the better SINR. At the transmitting station, the alternate embodiment spatially spreads a data signal modulated with the first tone. The spatial spreading uses spatial spreading codes in a process analogous to transmit beamforming. Separately, the alternate embodiment spatially spreads the data signal modulated with the second tone. Then, the two spatially spread signals are combined and transmitted from the multi-element antenna array, forming a transmitted spread signal that is spectrally and spatially spread.") 58:58-59:35 ("As shown in FIG. 72, the full-rate, high-bandwidth radio access station 192 comprises a transmit receive switch 300 that connects bidirectionally with the antenna 120. The structure and operation of the antenna 120 will be described in greater detail below with reference

’369 Patent	Agee 923
	to FIGS. 6 and 7. The transmit and receive switch 300 connects to a down converter 305 when in the receive mode and an up converter 307 while in a transmit mode. The transmit/ receive switch 300 further receives synchronization and packet timing data from a synchronization circuit 312. The down converter 305 receives the radio signals from the antenna 120 via the switch 300. In addition, the down converter 305 receives a local oscillator reference as well as an analog-to-digital converter clock from the synchronization circuit 312. The down converter 305 communicates with a demodulator 310 that, in turn, provides a feedback of automatic gain control level to the down converter 305. The demodulator 310 communicates bidirectionally with the synchronization circuit 312 and also provides an output to a code-nulling circuit 315. The code-nulling circuit 315 provides a frequency error signal to the synchronization circuit 312, and also communicates with a multidimensional trellis decoder 320. The multidimensional trellis decoder 320 connects to a digital data interface 325. The digital data interface 325 communicates bidirectionally with a remote control circuit 330. The remote control circuit 330 receives inputs from the demodulator circuit 310, the code-nulling circuit 315, and the multidimensional trellis decoder 320. The control circuit 330 further transmits status signals and receives command signals from the base station 110 (see FIG. 74). Finally, the remote control circuit 330 outputs axis parameters to a multidimensional trellis encoder 335, that also communicates with the digital interface 325. The multidimensional trellis encoder 335 communicates with a SCMA coding circuit 340. The SCMA coding circuit 340 further receives an input from the code-nulling circuit 315. The SCMA coding circuit 340 outputs signals to a modulator circuit 345 that also receives an input from the synchronization circuit 312. Finally, the modulation circuit 345 together with the synchronization circuit 312 provide inputs to the up converter 307. The up converter 307 outputs the data signal to the transmit receive switch 300 while the transmit receive switch is in the transmit mode. This signal is output over an error interface to the multiple subscribers 130 via the antenna 120.”). One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to

'369 Patent	Agee 923
	combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
19. The method as recited in claim 15, wherein said transmitting device is operatively coupled to a plurality of first device receive antennas.	Agee 923 discloses wherein said transmitting device is operatively coupled to a plurality of first device receive antennas. For example, see the following passages and/or figures, as well as all related disclosures: See claim 15. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
21. The method as recited in claim 15, wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes:	Agee 923 discloses wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: determining at least one angle of arrival of said reverse path data signal with respect to said at least one transmitting device receive antenna. For example, see the following passages and/or figures, as well as all related disclosures:

’369 Patent	Agee 923
determining at least one angle of arrival of said reverse path data signal with respect to said at least one transmitting device receive antenna.	Agee 923 teaches directing its transmission/reception at the base station toward desired signal sources which teaches this element. Claim 7 (“7. The highly bandwidth-efficient communications method of claim 6, wherein said despreading step adaptively positions the spatial direction of receive sensitivity towards a desired signal source and diminishes receive sensitivity from interfering sources.”) Claim 17 (“17. The highly bandwidth-efficient communications method of claim 16, wherein said despreading step adaptively positions the spatial direction of receive sensitivity towards a desired signal source and diminishes receive sensitivity from interfering sources.”) Claim 27 (“27. The highly bandwidth-efficient communications system of claim 26, wherein said signal despreader adaptively positions the spatial direction of receive sensitivity towards a desired signal source and diminishes receive sensitivity from interfering sources.”) 2:52-3:18 2:38-51 (“The Space Division Multiple Access (SDMA) transmission protocol involves the formation of directed beams of energy, whose radiation patterns do not overlap spatially with each other, to communicate with users at different locations. Adaptive antenna arrays can be driven in phased patterns to simultaneously steer energy in the direction of selected receivers.”) See Figures 102, 103; 13:52-63 (“FIG. 102 is a network diagram of two cells engaging in a first stage of retrodirective coupling, where the base station B1 in cell 1 detects the presence of interfering signals from the remote station R2 in the neighboring cell 2. Base station B1 adjusts its transmission in the direction of remote station R2 to diminish their signal strength. FIG. 103 is a network diagram of the two cells of FIG. 102 in a second stage of retrodirective coupling, where the base station B2 in the second cell 2 detects the presence of interfering signals from the remote station R1′ in the first cell 1. Base station B2 adjusts its transmissions in the direction of remote station R1′ to diminish their signal strength.”)

’369 Patent	Agee 923
	28:6-21 (“In accordance with one embodiment of the invention, the null regions of beams A and B are positioned in the direction of each of the interfering transceivers (e.g., transceivers operating on the same tone set and/or code as the intended transceiver). Thus, as depicted in FIG. 13, while beam A is directed towards remote A (since remote A is the intended receiver) the null of beam A is directed towards remote B (since remote B is an interferer). Similarly, beam B is directed towards remote B (since remote B is the intended receiver) while the null of beam B is directed towards remote A (since remote A is an interferer). A similar weighting scheme is observed when the remotes are transmitting and the base station is receiving. The same null-steering principle also may be applied to reduce the interference due to neighboring base stations.”) Fig. 16; 28:62-29:37. 78:50-59 (“The alternate embodiment of the invention can have the spatial despreading steps adaptively position spatial directions of the receiver sensitivity towards a desired signal source and/or diminish the receiver sensitivity from interfering sources. The alternate embodiment can also have et spreading steps adaptively position transmitted signal energy of the transmitted despread signal towards a source of the received spread signal and/or adaptively diminish the transmitted signal energy towards interferers. The alternate embodiment works well within the TDD protocol.”) 8:16-25 (“In another aspect of the invention, the spatial portions of the despreading weights are adaptively adjusted in value at the receiving station so that the spatial directions of low gain or the null regions of the receiver are adaptively positioned in a pattern so that the nulls are directed towards known interfering signal sources. In this manner, interfering signals are de-emphasized in the spatial domain. This “null steering” procedure may also be implemented during the derivation of the overall despreading weights that maximize the signal quality.”) One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one

'369 Patent	Agee 923
	of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
28. The method as recited in claim 13, further comprising: using at least one transmitting device transmit antenna operatively coupled to said transmitting device to transmit said modified forward path data signal over at least one forward transmission path to the receiving device.	Agee 923 discloses using at least one transmitting device transmit antenna operatively coupled to said transmitting device to transmit said modified forward path data signal over at least one forward transmission path to the receiving device. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], 1[b], 1[c] and claim 15. The base station in Agee 923 uses one or more transmit antennas to transmit the modified OFDM tones to the remote units over the downlink (forward) transmission path. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
32. The method as recited in claim 28, further comprising:	Agee 923 discloses setting at least one antenna pointing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.

’369 Patent	Agee 923
setting at least one antenna pointing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.	For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], 1[b], 1[c], claim 15, claim 21. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
33. The method as recited in claim 28, further comprising: setting at least one phased array antenna transmission directing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter.	Agee 923 discloses setting at least one phased array antenna transmission directing parameter associated with said at least one transmitting device transmit antenna based on said at least one forward path pre-equalization parameter. For example, see the following passages and/or figures, as well as all related disclosures: Agee 923 discloses phased arrays and their control based on the forward path pre-equalization parameter. See discussion in 1[p], 1[b], 1[c], claim 15, claim 21. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to

’369 Patent	Agee 923
	combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
35. The method as recited in claim 28, further comprising: selecting said at least one transmitting device transmit antenna from a plurality of transmitting device transmit antennas that are each operatively coupled to said transmitting device.	Agee 923 discloses selecting said at least one transmitting device transmit antenna from a plurality of transmitting device transmit antennas that are each operatively coupled to said transmitting device. For example, see the following passages and/or figures, as well as all related disclosures: See claim 15. The base station has a plurality of antennas and one or more of those antennas are used to transmit data. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
36. The method as recited in claim 35, further comprising: selectively transmitting a plurality of beams using two	Agee 923 discloses selectively transmitting a plurality of beams using two or more transmitting device transmit antennas. For example, see the following passages and/or figures, as well as all related disclosures: See claims 13, 21 discussing beam forming.

'369 Patent	Agee 923
or more transmitting device transmit antennas.	See 77:55-80:10 and Figures 84A, 84B, 85A, 85B describing the adaptive beamforming. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
37. The method as recited in claim 36, wherein each of said transmitted plurality of beams is selectively adjusted in phase and amplitude to reduce multipath affects when received by said receiving device.	Agee 923 discloses wherein each of said transmitted plurality of beams is selectively adjusted in phase and amplitude to reduce multipath affects when received by said receiving device. For example, see the following passages and/or figures, as well as all related disclosures: See claims 13, 21, 36 discussing beamforming. See discussion in 1[p], 1[a], 1[b], 1[c] of the application of the various calculated weights to achieve the ultimate signals that are transmitted via beam forming. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants' Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention

’369 Patent	Agee 923
	document discussing the Antenna Arrays references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.
41. The method as recited in claim 1, wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: sub-band equalizing said forward path data signal using corresponding frequency domain reverse path data.	Agee 923 discloses wherein determining said at least one forward path pre-equalization parameter based on said at least one transmission delay further includes: sub-band equalizing said forward path data signal using corresponding frequency domain reverse path data. For example, see the following passages and/or figures, as well as all related disclosures: See discussion in 1[p], 1[a], 1[b], 1[c] of the application of the various calculated weights using the reverse path frequency domain to achieve the ultimate signals that are transmitted. One of ordinary skill would find this limitation disclosed either expressly or inherently in the teachings of this reference and its incorporated disclosures taken as a whole, or in combination with the state of the art at the time of the alleged invention. To the extent this reference is not found to teach this element explicitly, implicitly, or inherently, the element would have been obvious to one of ordinary skill in the art based on this reference, common sense, ordinary creativity of one of ordinary skill in the art, and the state of the art. Additionally, it would have been obvious to combine this reference with one or more other prior art references identified in Defendants’ Invalidity Contentions Cover Pleading, particularly, the passages in the base invalidity contention document discussing the Channel Estimation and OFDM Tone Modification references. Rather than repeat those disclosures here, they are incorporated by reference into this chart.